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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/657,132	09/09/2003	Ching-Hsu Yang	YANG3150/EM	1902

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EXAMINER	
MITCHELL, JAMES M	

ART UNIT	PAPER NUMBER
2813	

DATE MAILED: 07/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/657,132	YANG, CHING-HSU	
	Examiner	Art Unit	
	James M. Mitchell	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 4-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 4-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to applicant's amendment filed March 1, 2006.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 4-6, 12 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi (U.S. 5,525,548) in combination with Williams (U.S 6,730,998).

4. Nishiguchi (Fig. 1, 2, 10A) discloses:

(cl. 1) a thermal enhance semiconductor package, comprising: a carrier (1) having an upper surface and a lower surface opposed to the upper surface; a semiconductor chip (6) having an active surface, a back surface opposed to the active surface and a plurality of bonding pads (i.e. portion of chip in contact with ball, "b"; Fig. 10A) formed on the active surface; a plurality of conductive devices ("b"), which are formed on the bonding pads and connect the active surface of the semiconductor and the upper surface of the carrier; and a universal heat spreader (4,3), the universal heat spreader disposed on the back surface of the semiconductor chip (Fig. 2) wherein a plurality of heat dissipation pins (3) is disposed through holes (not labeled); (12) and heat transmission adhesive ("s") formed between the back surface of the chip and a surface of the heat spreader;

(cl. 4) the pin with an outer layer of copper (Col. 5, Lines 40-43)[1];

(cl. 5, 6) the heat spreader comprises copper or aluminum (Col. 5, Lines 36-39);

(cl. 16) the conductive device is a conductive bump (e.g. "b"; Fig. 10A).

5. Nishiguchi does not appear to disclose additional holes providing air convection.

6. Williams (Fig. 1,2, 6) utilizes forming holes in a heat spreader for air convection (Abstract).

7. It would have been obvious to incorporate additional holes in the spreader of Nishiguchi in to provide added facilitation of cooling as taught by Williams (Col.6, Lines 49-54).

8. Claims 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi (U.S. 5,525,548) and Williams (U.S 6,730,998) as applied to claim 1 and further in combination with Ootsuki et al. (U.S. 5,652,461).

9. Nishiguchi further discloses a coating of inner walls ("m"; Fig. 3A), but does not appear to show either alone or in combination with Williams that its spreader is formed from silver or a combination such that the hole is lined with copper while the spreader is for example aluminum.

10. Ootsuki (Col. 3, Lines 23-26) discloses forming a spreader from wither a thermal conductor of copper, aluminum, silver or combination.

11. It would have been obvious to one of ordinary skill in the art to form the modified spreader of Nishiguchi from a combination of materials such as for example copper,

[1] An item that is made from a particular material also has an outer layer of that material.

aluminum and silver in order to provide high thermal conductivity as taught by Ootsuki (Col. 3, Lines 23-26).

12. Furthermore[2] the claimed material would have been obvious, since it has been held that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945); See also MPEP 2144.07.

13. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi (U.S. 5,525,548) and Williams (U.S 6,730,998) as applied to claim 1 and further in combination with Akram (U.S.2002/0185748).

14. Neither Nishiguchi nor Williams appear to show use of a filler/underfill disposed under active area of chip and carrier; however, Akram (Fig. 5) utilizes an underfill (28).

15. It would have been obvious to one of ordinary skill in the art to incorporate an underfill along the active area of Nishiguchi's chip in order to enhance joint integrity as taught by Akram (Par. 0006).

16. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi (U.S. 5,525,548) and Williams (U.S 6,730,998) as applied to claim 1 and further in combination with Chia et al. (U.S. 5,933,710).

17. Neither Nishiguchi nor Williams appear to show a plurality of solder balls formed on the lower surface of the carrier.

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[2] Nishiguchi discloses its pin material may be "etc."

18. However, Chia (Fig. 3) utilizes a plurality of solder balls formed on the lower surface of the carrier.

19. It would have been obvious to one of ordinary skill in the art to incorporate forming balls on the lower surface of the carrier/substrate of Nishiguchi in order to increase input/output connections as taught by Chia (Abstract).

20. Claims 1 and 12-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tao (U.S. 6,410,981) in combination with Nishiguchi (U.S. 5,525,548) and Xu (U.S. 2003/0143382)

21. Tao[3] (Fig. 7, 8) discloses:

(cl. 1) a thermal enhance semiconductor package, comprising: a carrier (3) having an upper surface and a lower surface opposed to the upper surface; a semiconductor chip (4) having an active surface, a back surface opposed to the active surface and a plurality of bonding pads (i.e. portion of chip in contact with ball, 8) formed on the active surface; a plurality of conductive devices (8), which are formed on the bonding pads and connect the active surface of the semiconductor and the upper surface of the carrier; and a universal heat spreader having a plurality of through holes (10) that provides air convection , the universal heat spreader (1; Col. 2, Lines 22-25) disposed on the back surface of the semiconductor chip;

[3] Likewise Fig. 1, 2A could have been used to reject claim with through-holes, 12 going through a portion of cap as shown in Fig. 2A.

(12) and heat transmission adhesive (e.g. cap able to release heat; item 5,7) formed between the back surface of the semiconductor chip and the upper surface of the carrier (e.g. *interpreted to mean HA between the spreader and back of chip*; Fig. 7);

(cl. 13) a stiffener ring (2) connecting the carrier and the universal heat spreader via a heat transmission adhesive (7);

(cl. 14) with the ring around the chip (Fig.7);

(cl. 15) with a filler/underfill (5) disposed under active area of chip and carrier;

(cl. 16) wherein one of the conductive devices is a conductive bump (8);

(cl. I 7) and a plurality of solder balls (6) formed on the lower surface of the carrier.

22. Tao does not appear to show heat transmission pins through holes.

23. However Nishiguchi utilizes heat transmission pins/fins (3) through holes (Fig. 2), while Xu further evidences the use of fins to increase dissipation (Par. 0029).

24. It would have been obvious to one of ordinary skill in the art to incorporate in the cap of Tao, Nishiguchi's technique of forming pins through holes the cap in order to further increase heat dissipation by increasing surface area as taught by Xu (Par. 0029)

25. Claims 4-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tao (U.S. 6,410,981), Nishiguchi (U.S. 5,525,548) and Xu (U.S. 2003/0143382) as applied to claim 1 and further in combination with Ootsuki et al. (U.S. 5,652,461).

26. The modified structure of Tao does not appear to show either alone or in combination with Williams that its spreader is formed from copper, aluminum or silver,

or a combination such that the hole is lined with copper while the spreader is for example aluminum. See Paragraphs 10-12 of this office action[4].

Response to Arguments

27. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

28. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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[4] Substituting Tao for the primary reference instead of Nishiguchi.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 8:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jmm, J.D
July 21, 2006

CARL WHITEHEAD, JR.
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